

A vertical lightning bolt graphic on the left side of the slide, extending from the top to the bottom.

A First Look at Geostationary Lightning Mapper Observations

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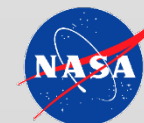
²ENSCO, Inc.,

³Earth System Science Center, University of Alabama in Huntsville,

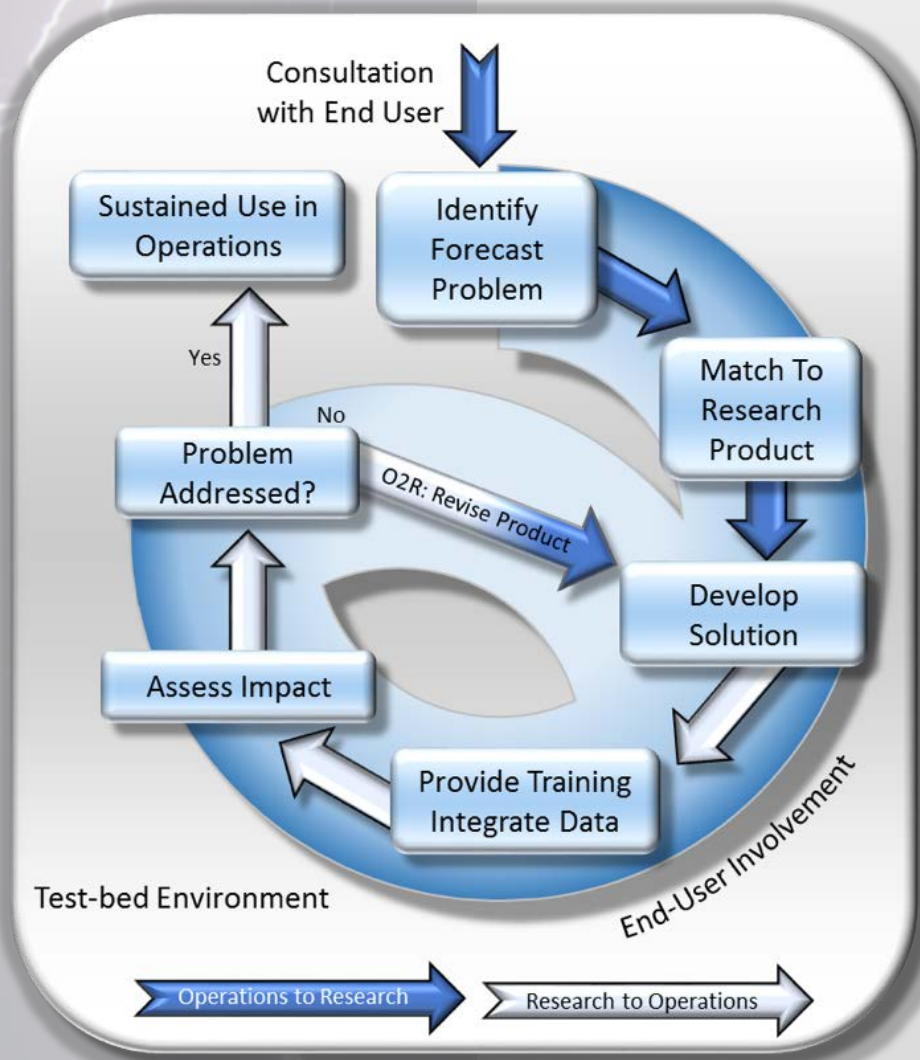
⁴Jacobs Technology, ESSSA Group

A Short Outline

- What is NASA SPoRT?
- Status of the Geostationary Lightning Mapper (GLM) to operations
- Goals of an operational assessment
- Early, potential uses (examples)
- Future Work



The SPoRT Paradigm



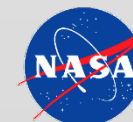
Short-term Prediction Research and Transition Center (SPoRT)

Keys to success

- **Involve** end users throughout the entire process.
- **Develop** end-user appropriate training on how to understand and correctly use the solution that has been developed.
- **Assess** impact of solution on operations.

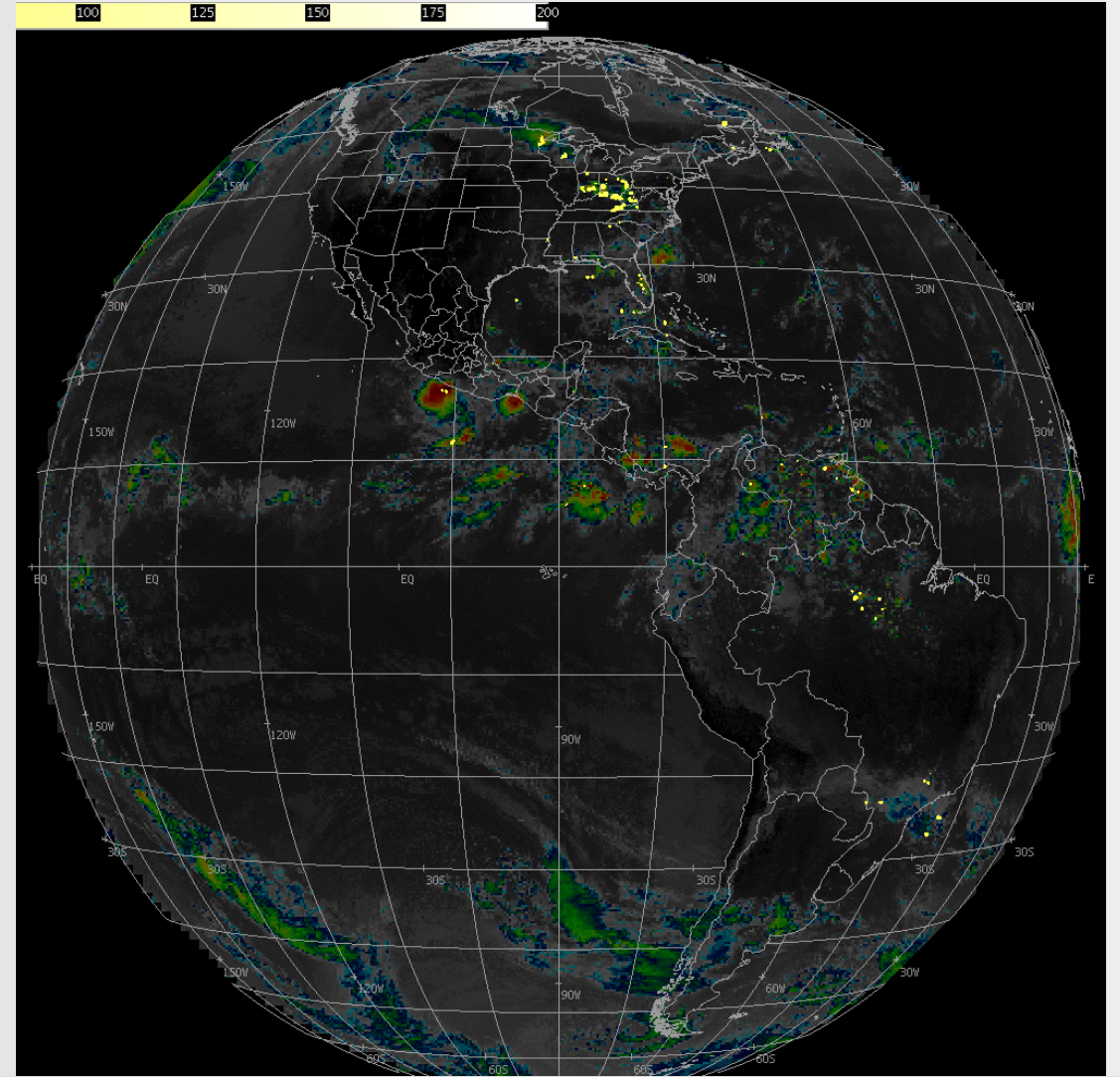
Success occurs when a new capability has a predominately positive impact on the forecast problem used in the end users decision support system “operationally”.

“Operational” use means regular or sustained use of data / products to make decisions

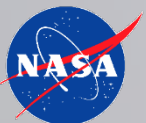


Status of the GLM to Operations

- Primary concerns include:
 - Geolocation error
 - Corrections to the United States' National Weather Service viewing system (AWIPS)
- Fixes to be applied!
- Main result is that operational users are not yet receiving these data
- Have been able to speak with forecasters post-event in case-by-case style

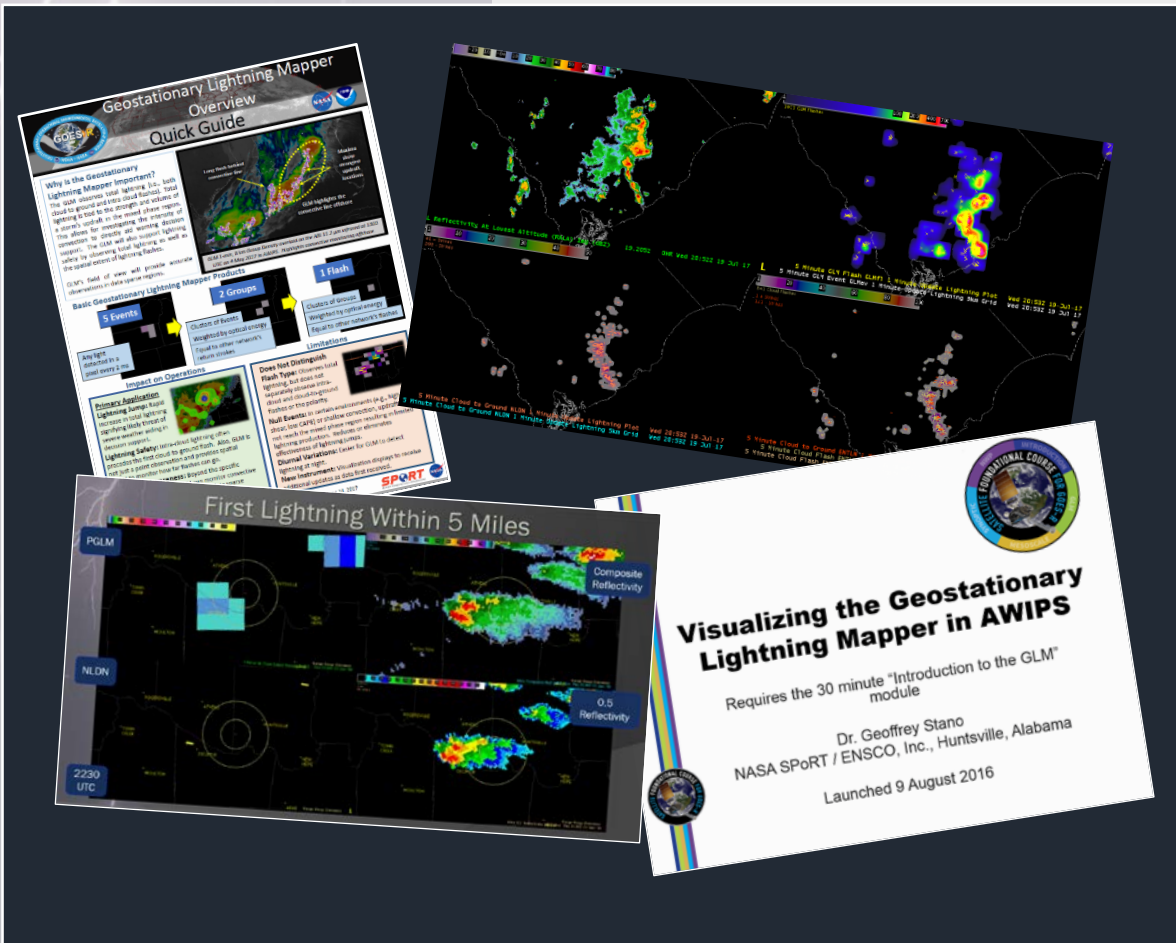


13 June 2017 from 1719-1819 UTC (Preliminary, non-operational)

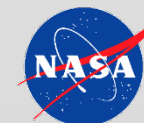


Goals of the Operational Assessment

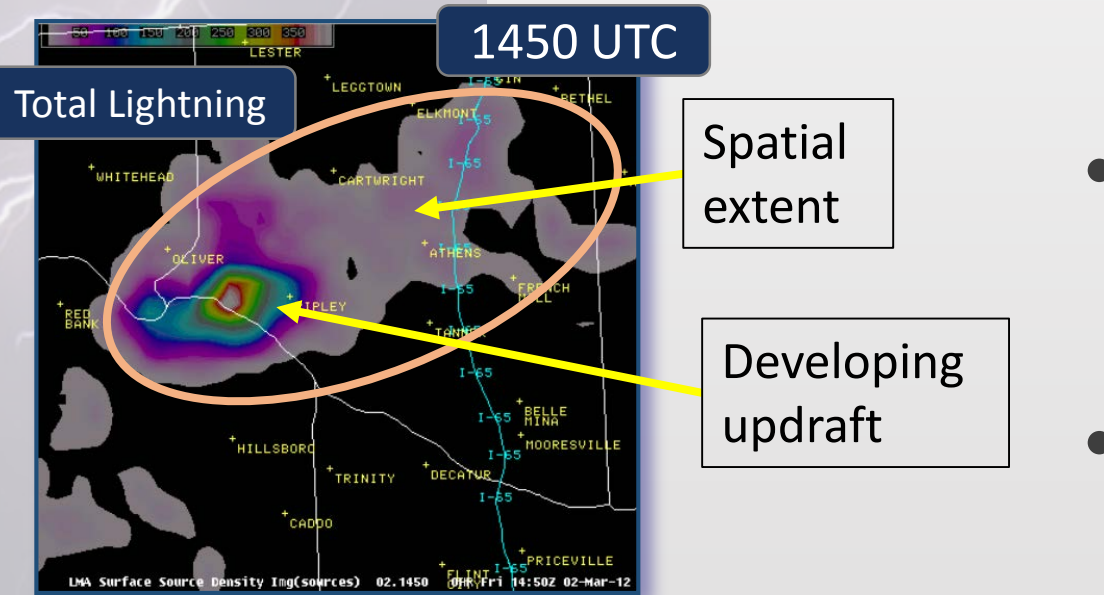
- Provide initial training
- Variety of geographic and forecast needs
- Evaluate GLM in day-to-day operations
- Compliment other Proving Ground work
- Identify uses (more than just severe weather)
- Identify forecaster-requested training
- Identify forecaster-requested “products”
- Incorporate forecaster examples into an applications library for training



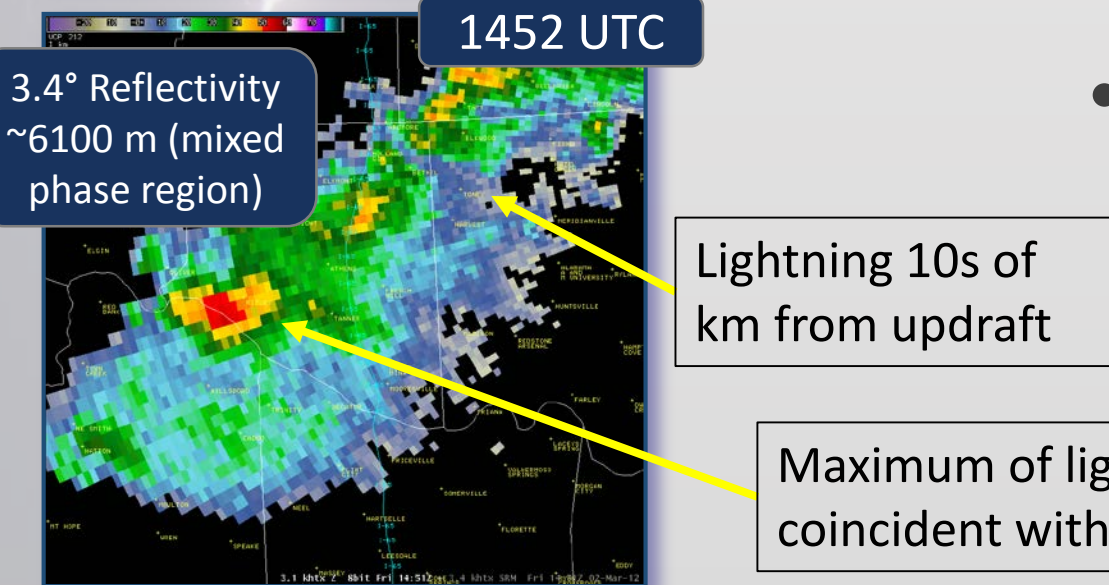
Examples of initial training material.



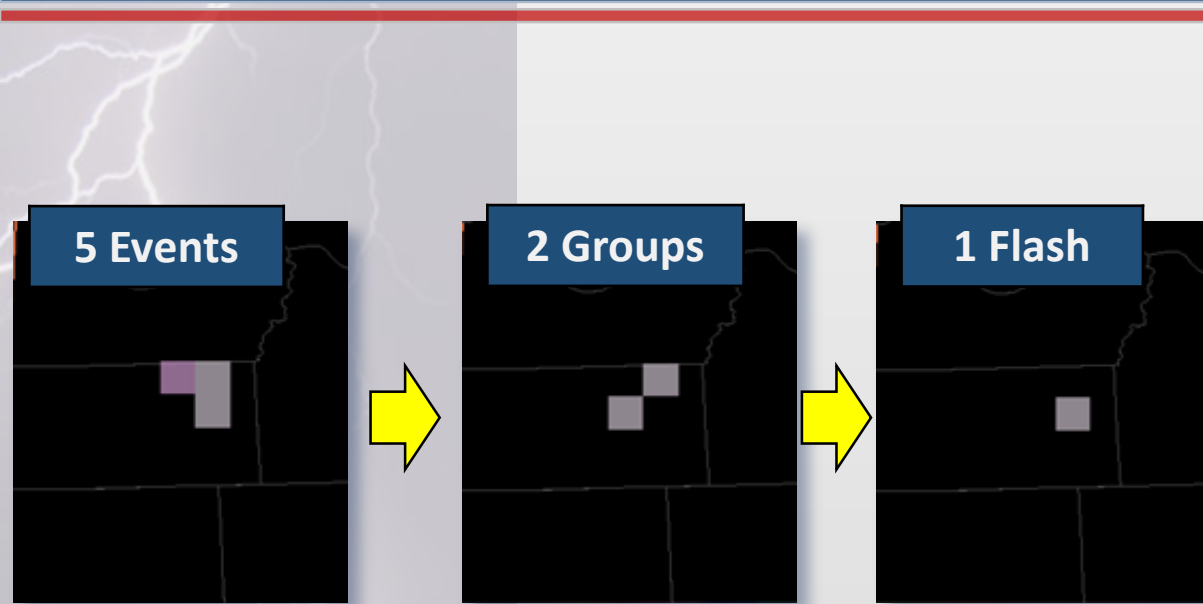
Key to Success: Show GLM's Relevance



- Physical reasoning for total lightning
 - If in the mixed phase region ...
 - Stronger updrafts = more total lightning
- Build on work with lightning mapping arrays
 - Reinforce physical reasoning
 - Examples for safety, aviation, severe weather
- Connect GLM with radar observations
 - Creates “trust” in data
 - Allows for use in data sparse locations



Early GLM Display

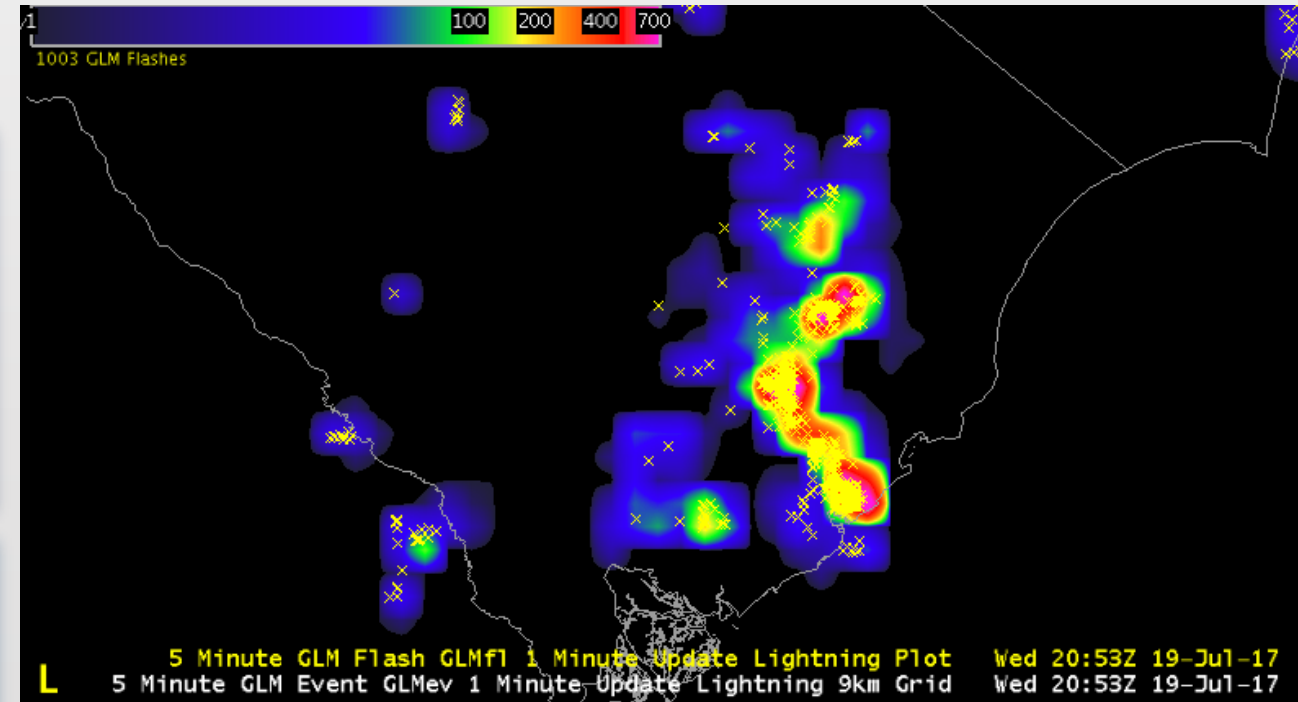


Event: Any illuminated pixel in 2 μ s period.

Group Centroid: Optically weighted cluster of events in time and space. Equivalent to return strokes.

Flash Centroid: Optically weighted cluster of groups (based on events) in time and space.

(Preliminary, non-operational)



- Identify lightning location / extent (events)
- Color highlights intensification
- Flash centroids allow for total counts

Comparison With Available Ground Networks

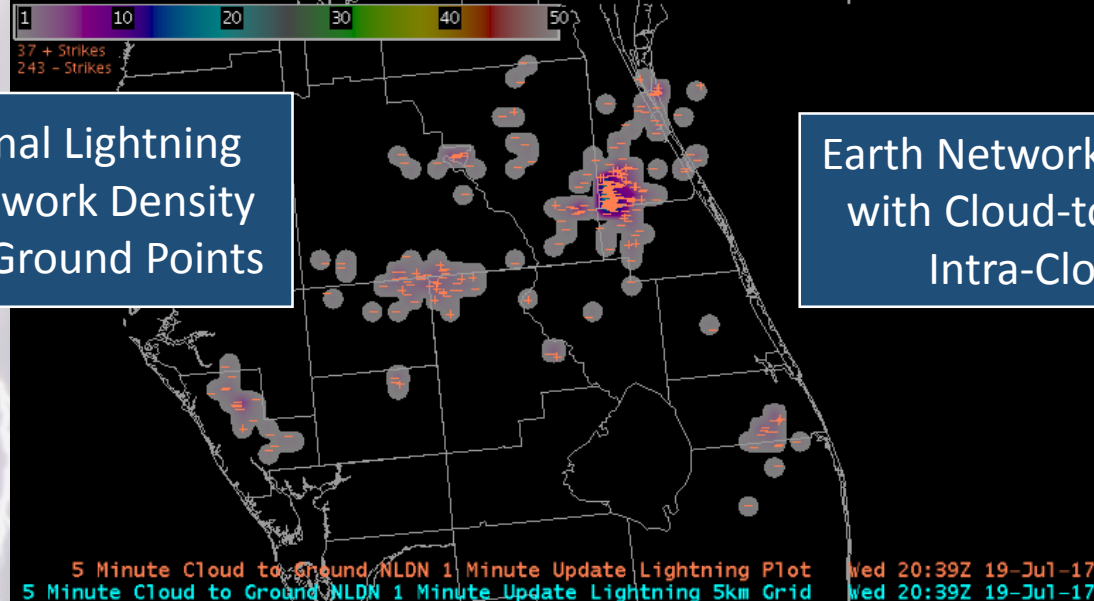
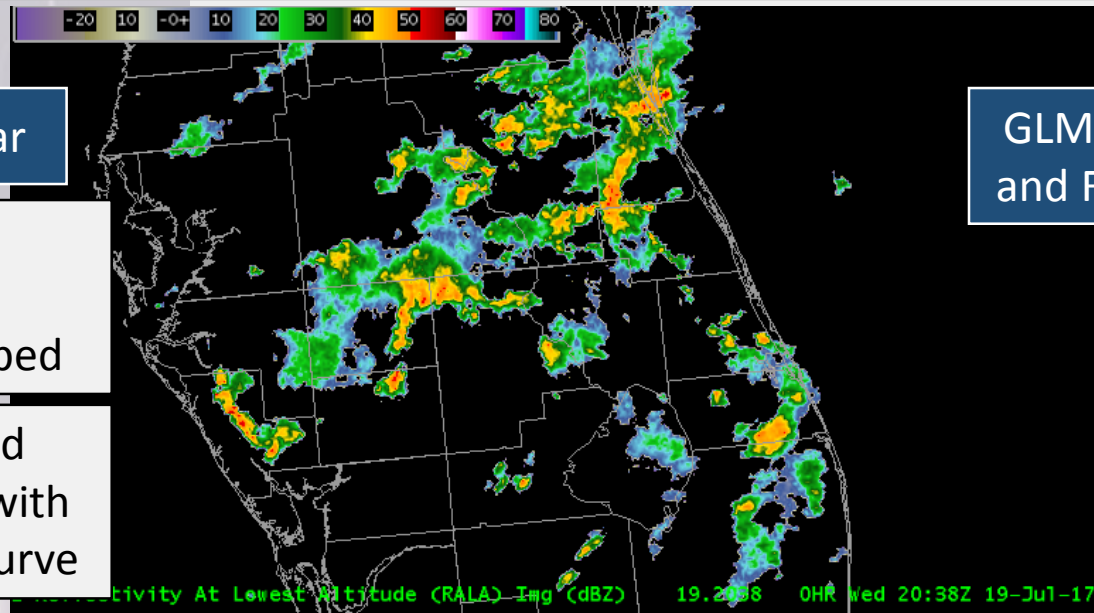
Radar

Courtesy of
Hazardous
Weather Testbed

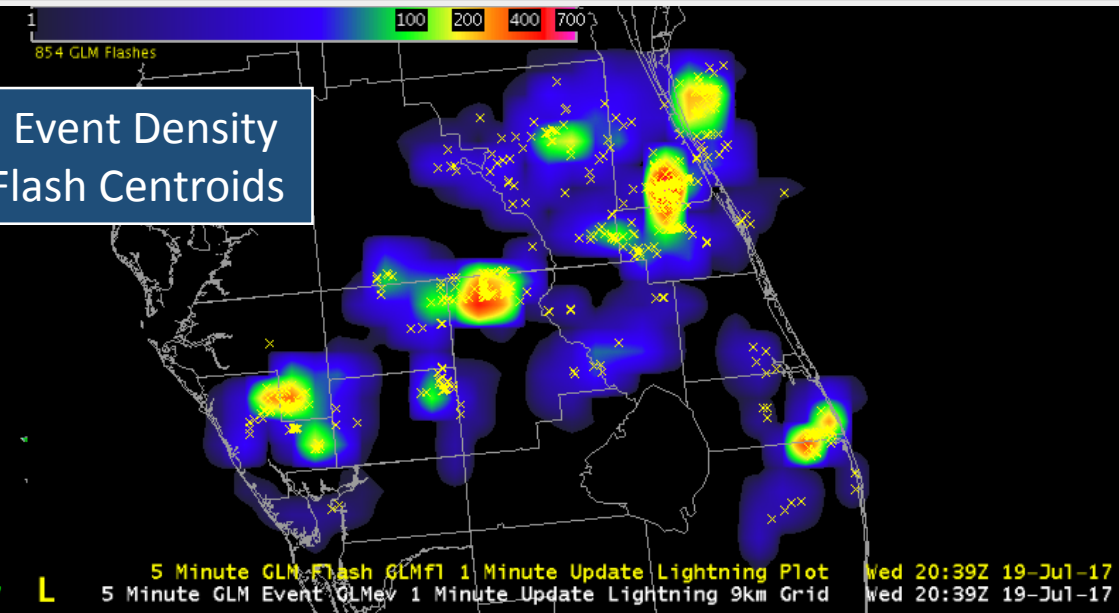
Recommended
HWT display with
SPoRT color curve

Vaisala National Lightning
Detection Network Density
and Cloud-to-Ground Points

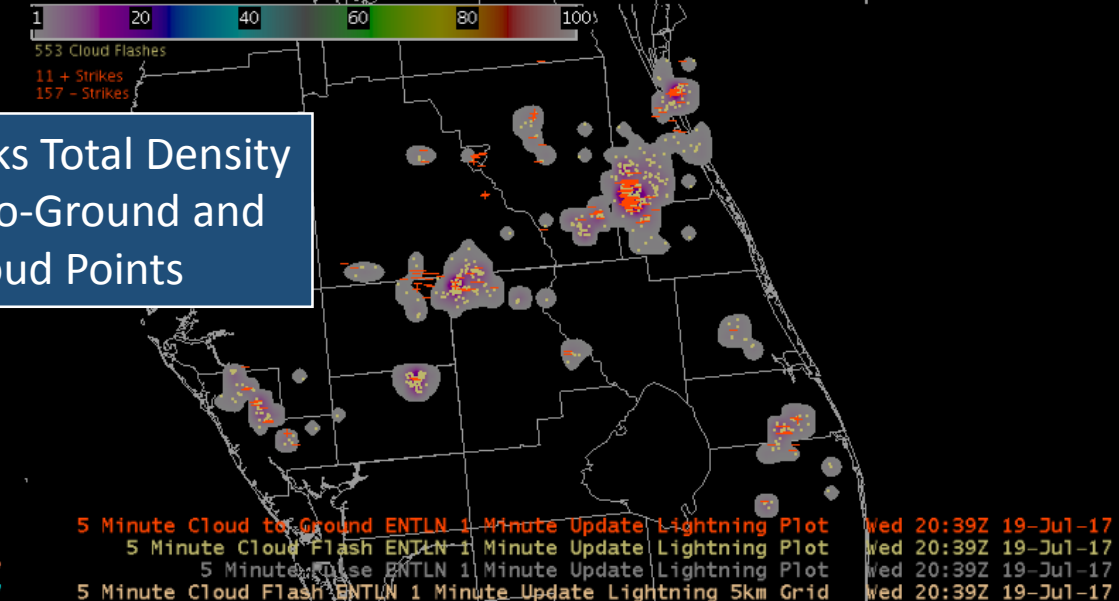
*(Preliminary,
non-
operational)*



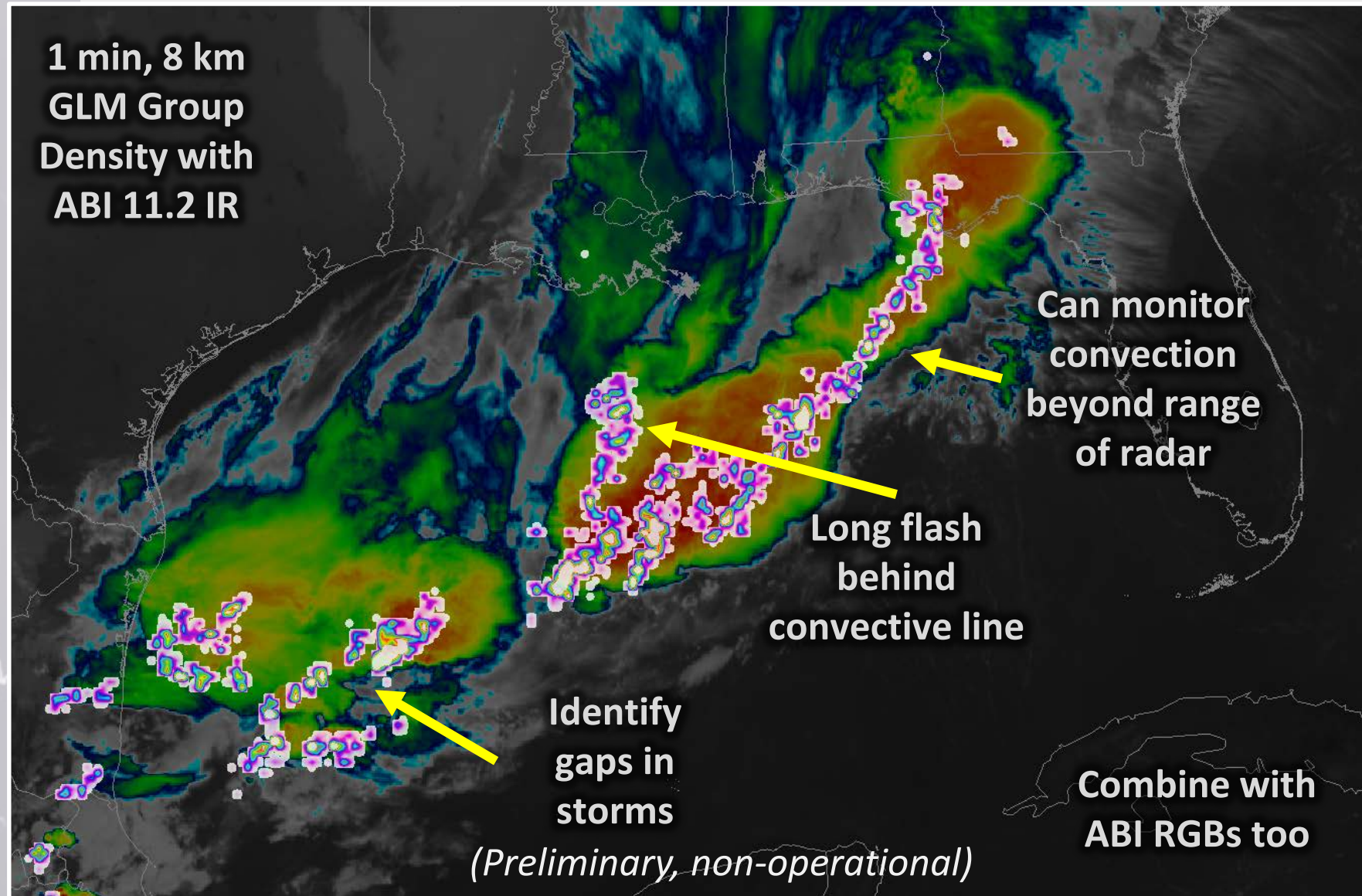
GLM Event Density
and Flash Centroids



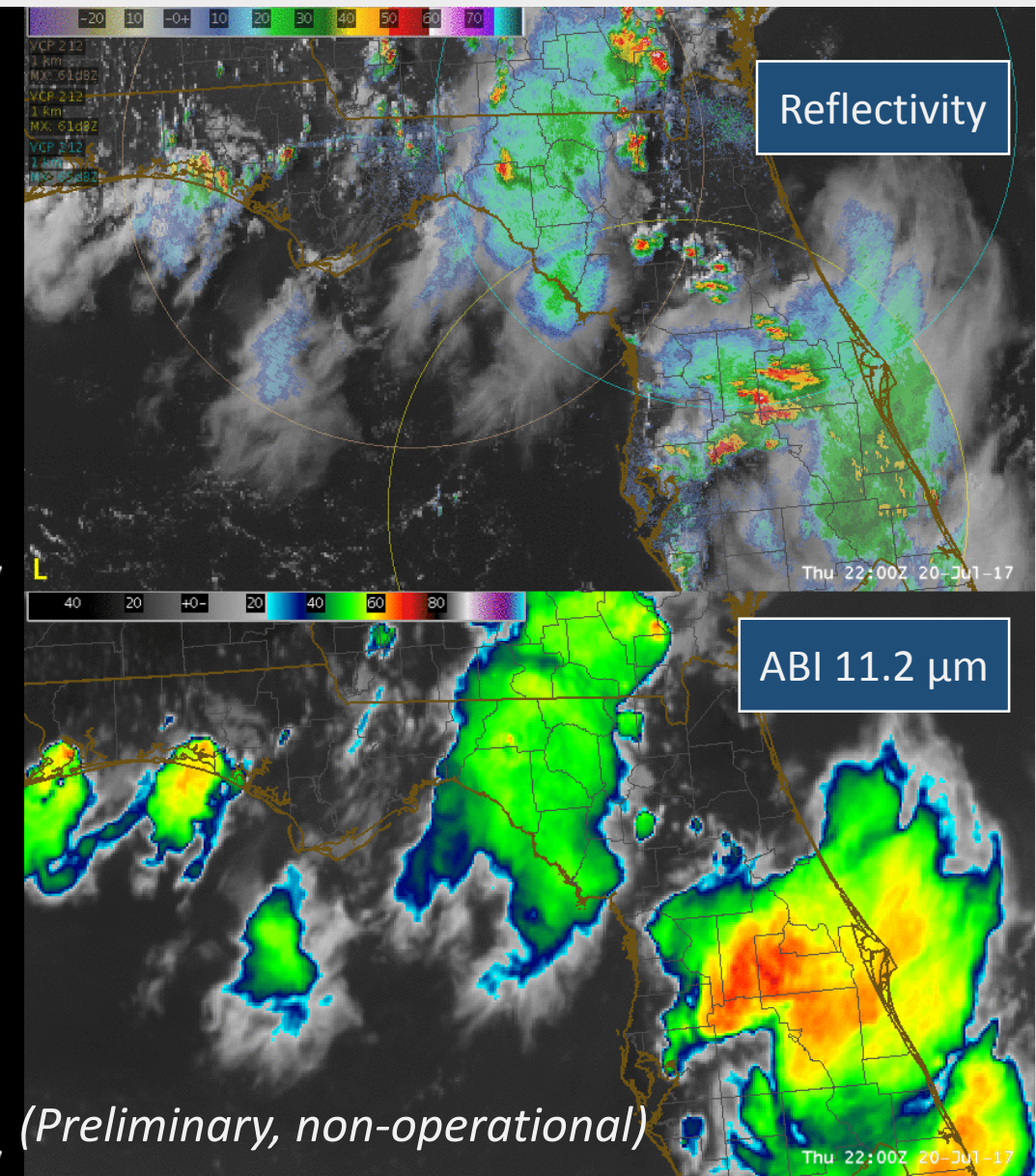
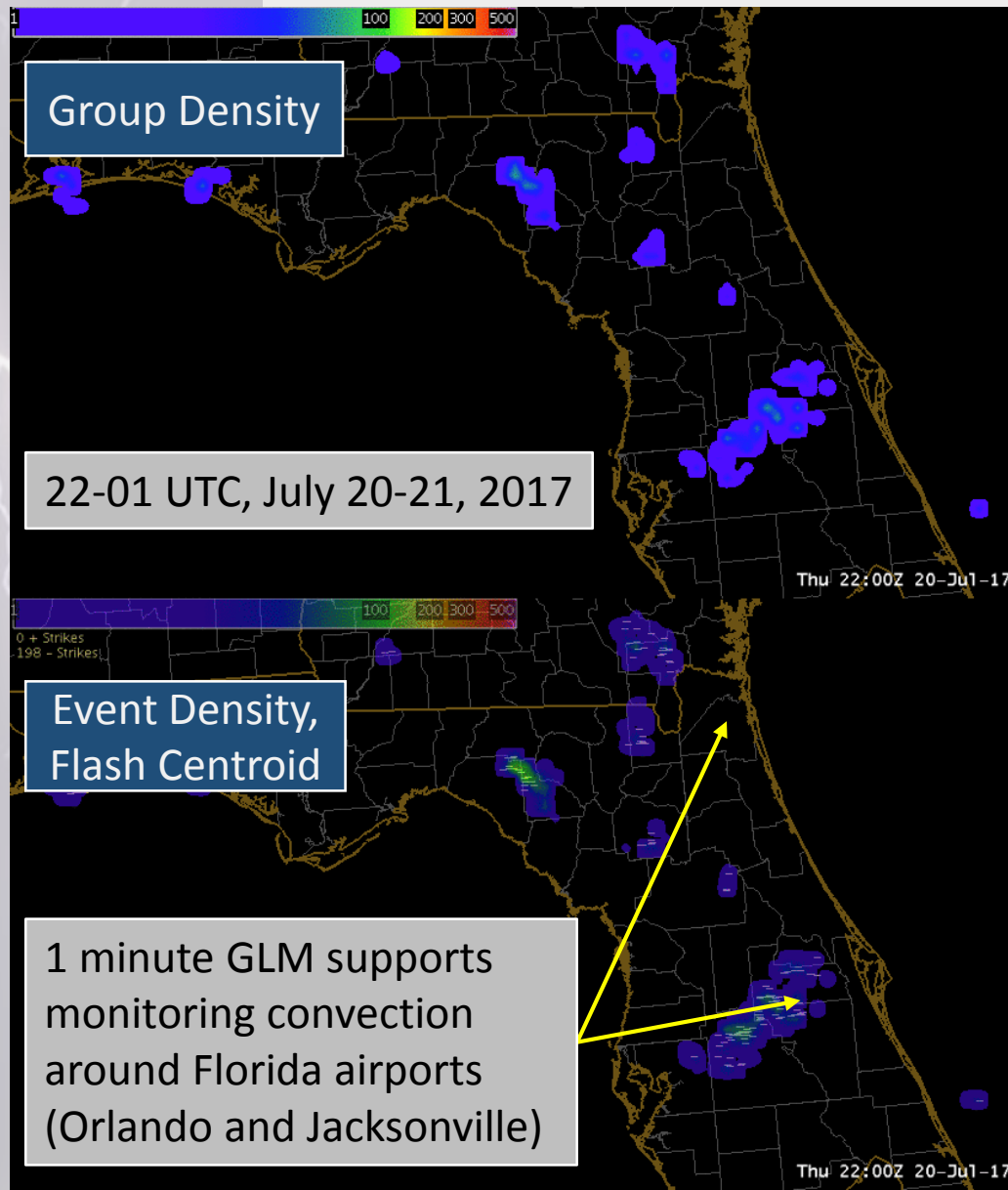
Earth Networks Total Density
with Cloud-to-Ground and
Intra-Cloud Points



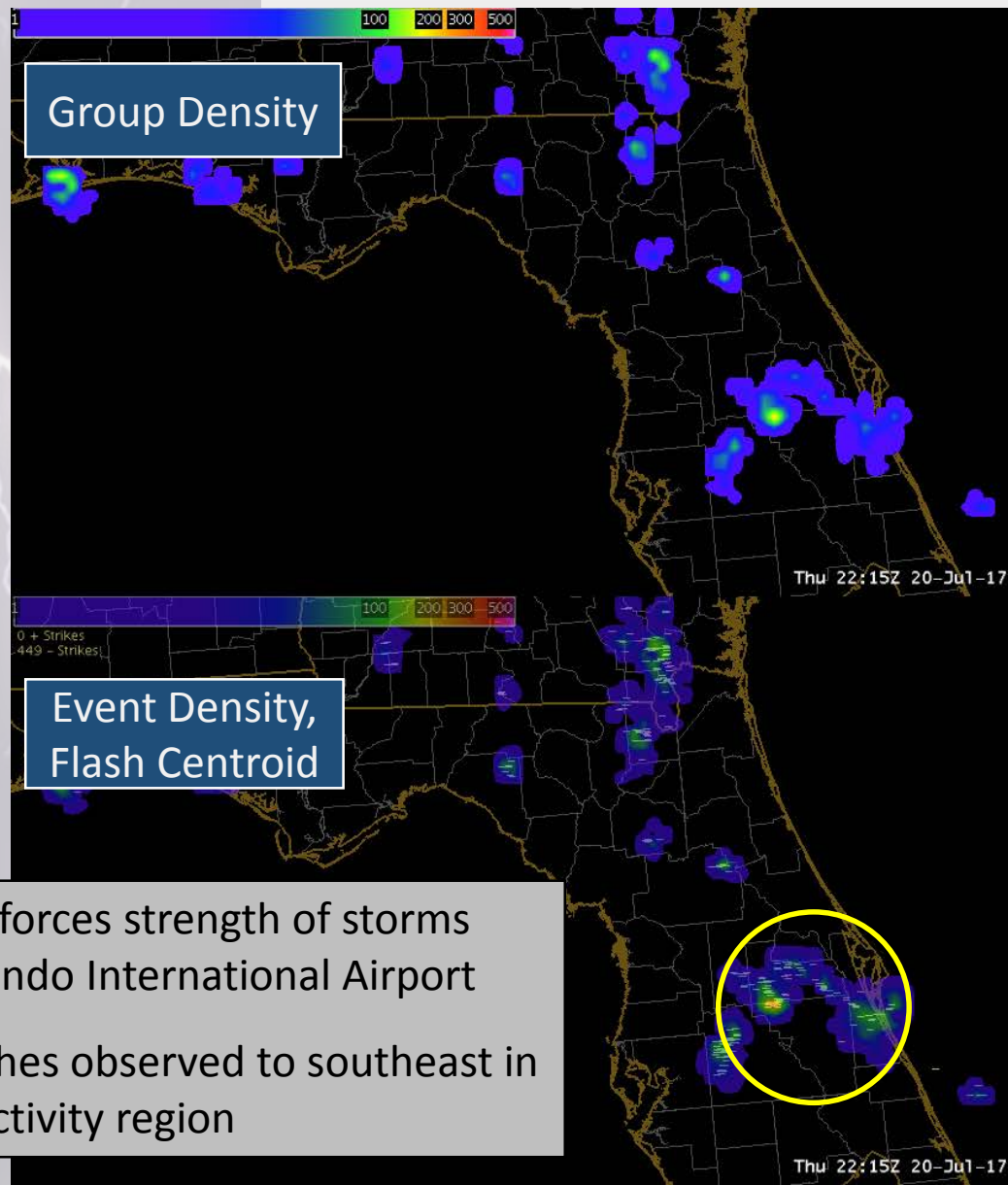
Data Sparse Region (Gulf of Mexico)



Convective Monitoring (Animation)

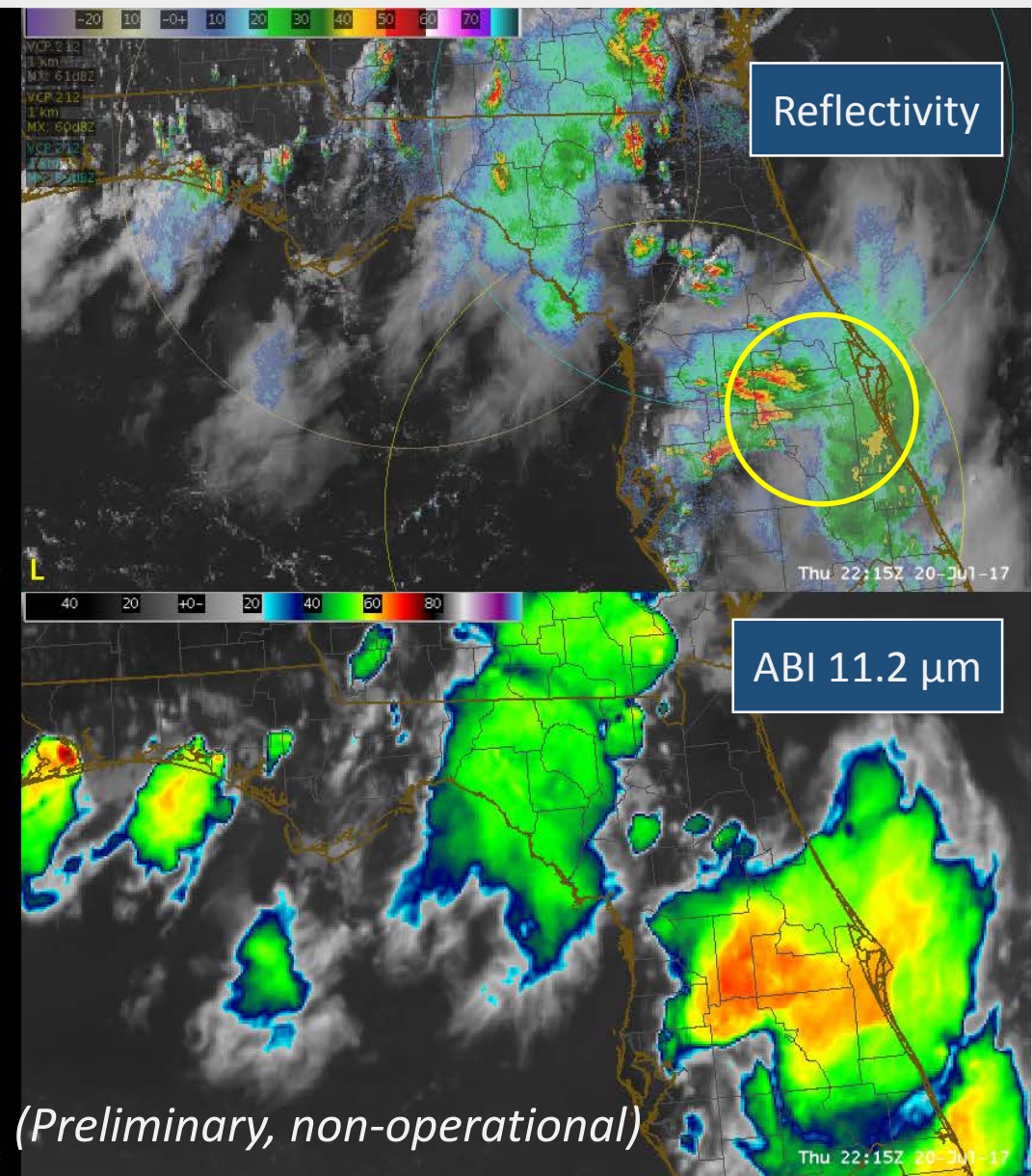


Convective Monitoring (Still Image)



GLM reinforces strength of storms near Orlando International Airport

Note flashes observed to southeast in low reflectivity region



(Preliminary, non-operational)

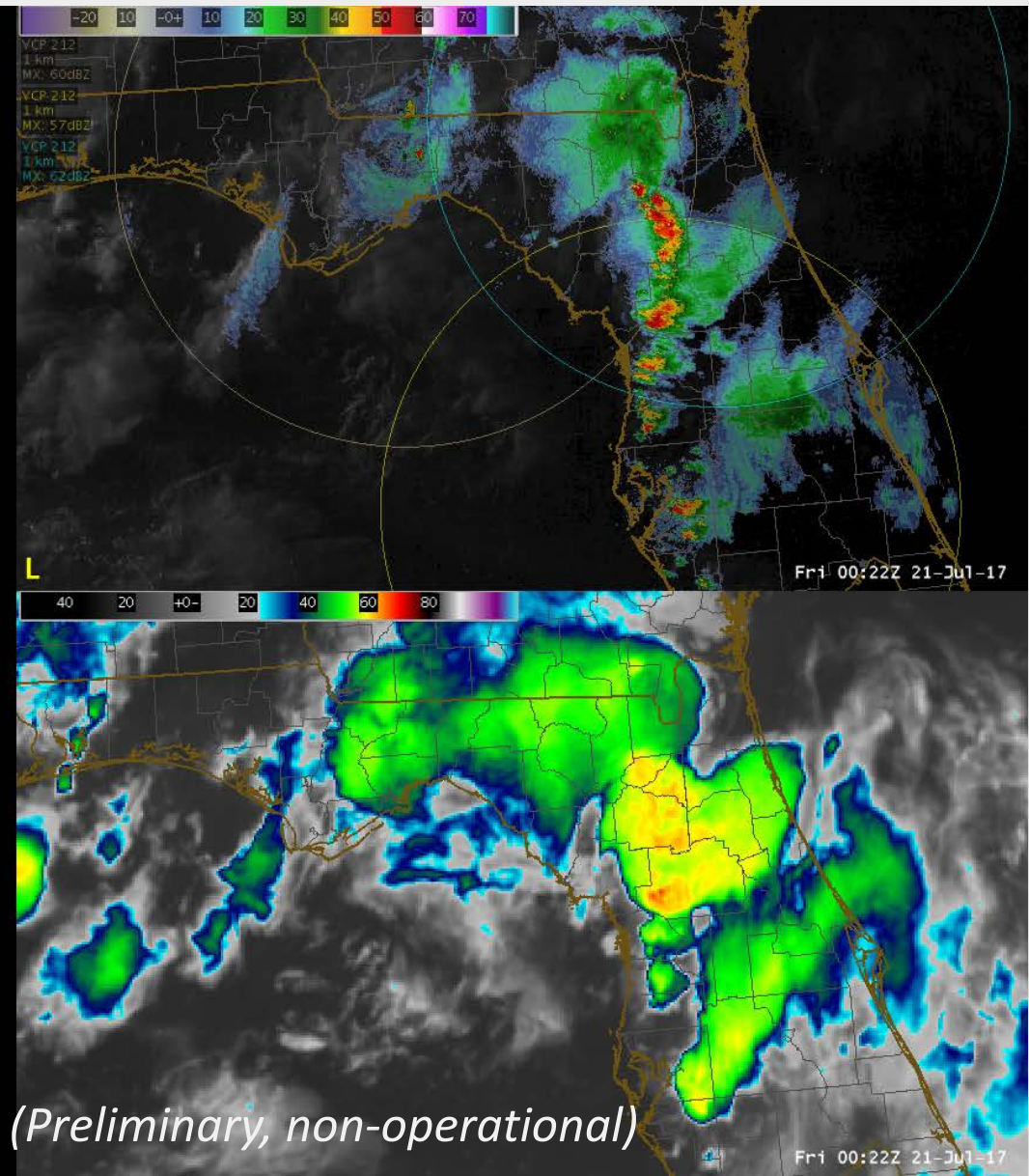
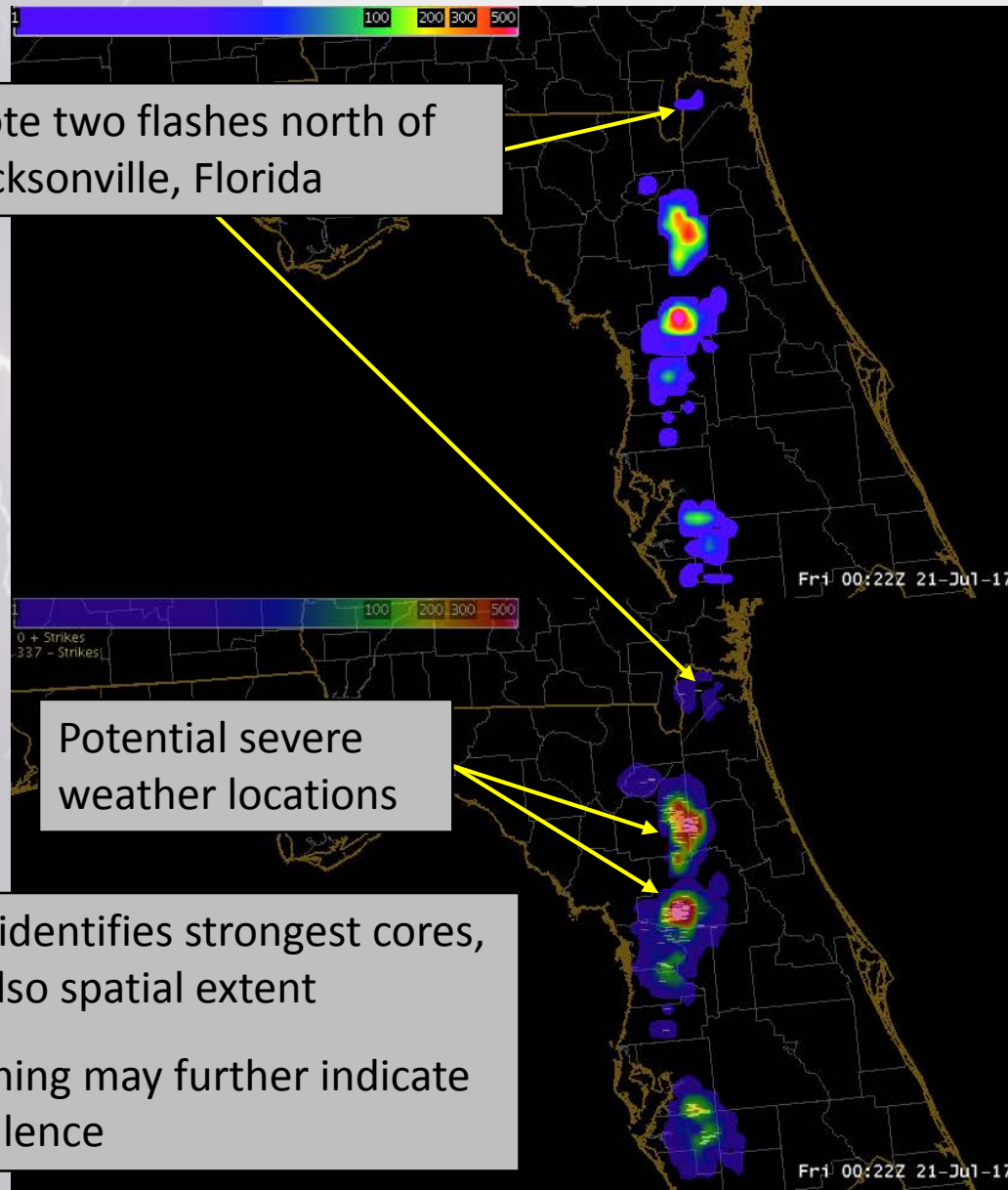
Convective Monitoring (Still Image)

Note two flashes north of Jacksonville, Florida

Potential severe weather locations

GLM identifies strongest cores, but also spatial extent

Lightning may further indicate turbulence



(Preliminary, non-operational)

Long Flash Example (Lightning Safety)

Yellow: Numerous small particles – Strong convection

Red/orange: Larger particles – Weaker, mature convection

1716 UTC

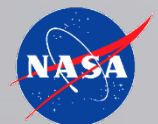
GLM groups

Radar Reflectivity

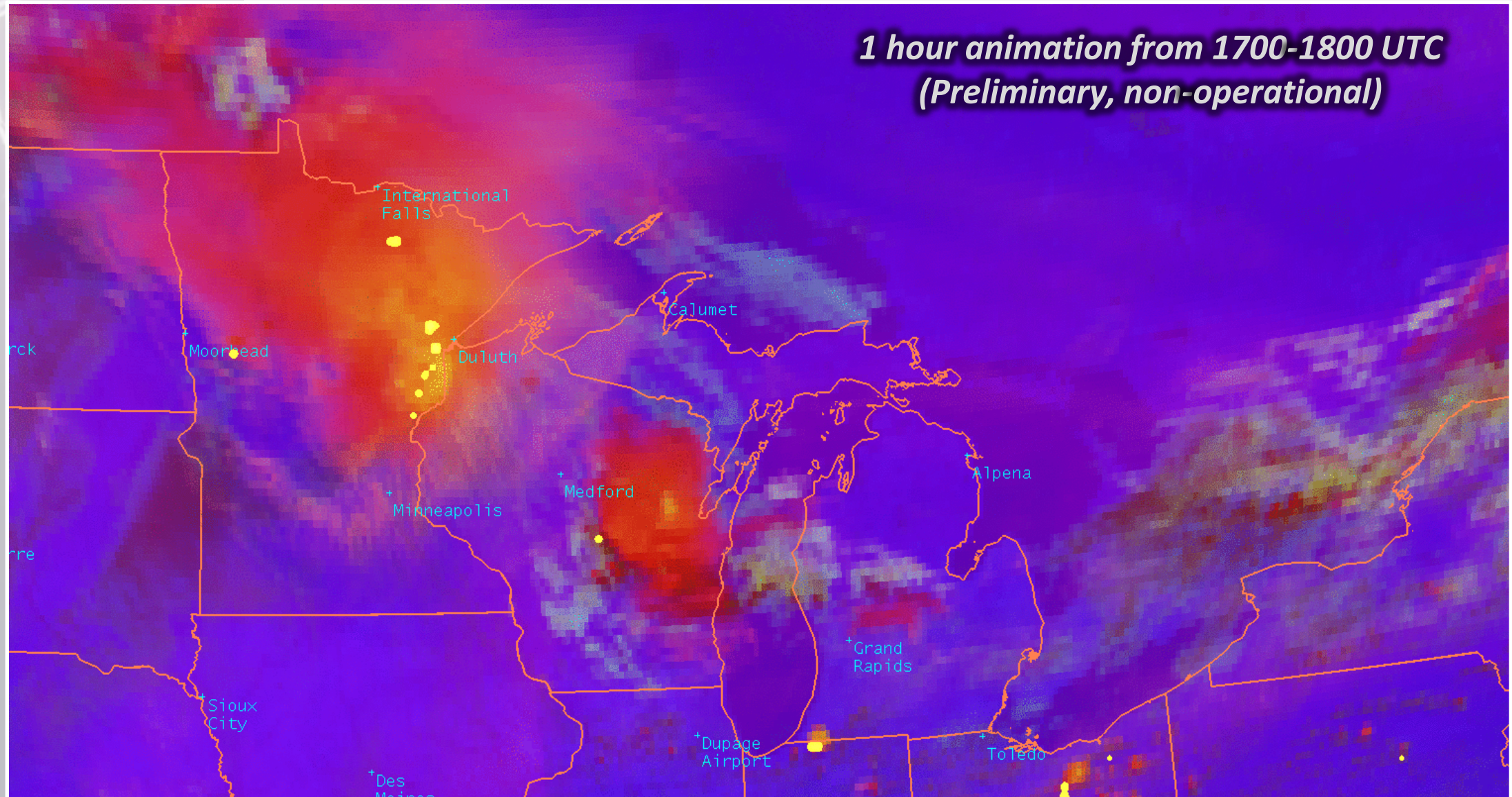
Large flash originating in main convection and extending 100+ miles into stratiform region

1717 UTC

*ABI Daytime Convection RGB with GLM Groups
(Preliminary, non-operational)*

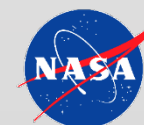


Long Flash Example Animation (Lightning Safety)



Future Activities / Acknowledgements

- Continue developing Proving Ground training
 - Conduct GLM assessment (Spring 2018)
 - Conduct assessment with local emergency managers
 - Collaborate on GLM uses with aviation partners
 - Develop GLM applications library examples (from forecasters!)
 - Identify additional visualizations (flash extent density)
 - Investigate using optical energy observations
-
- Many thanks to the GOES-R Proving Ground for funding



Questions?

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NASA SPoRT

<https://weather.msfc.nasa.gov/sport>

NASA SPoRT Blog

<https://nasasport.wordpress.com>



5 minute GLM event density with 5 minute ABI 11.2 micron infrared of Hurricane Irma from 0200 UTC, 9 September 2017 through 0000 UTC 11 September 2017 (Preliminary, non-operational)

